Loda Lake Interpretive Resources

Huron-Manistee National Forests
Baldwin Ranger District
650 N. Michigan Avenue
Drawer D
Baldwin, MI 49304
231-745-4631

Funding for this CD provided by the Fremont Area Community Foundation

Loda Lake Interpretive Resources

Introduction

Loda Lake Wildflower Sanctuary is a special place in many ways, not the least of which that it is the only designated wildflower sanctuary in the National Forest system. It is home to over 200 species of plants and wildflowers native to Michigan and it has an interesting and varied history. Because of its special nature, this CD has been created to provide interpretive and educational resources for volunteers leading tours at Loda Lake Wildflower Sanctuary, as well as for teachers to use when bringing their students to explore the sanctuary. The CD includes:

- scripts for two themed interpretive walks keyed to the map;
- background information on the history of the area that is now Loda Lake Wildflower Sanctuary;
- background information on the geology and soils, natural communities, and selected plants and wildlife found at Loda Lake;
- a variety of Newaygo County maps showing geology, pre-settlement vegetation, and other resources;
- historical photos of the area as well as photos of selected plants and animals;
- several student activities for teachers to use with students while at the sanctuary;
- a list of resources used in developing the CD and where you can go for further information.

The information and resources included here cover basic information about Loda Lake, and a sampling of the many plants and animals found here. There is more information, more photos, more interpretive walk ideas, and other resources about the plants and animals of Loda Lake than can fit onto one CD. We have included a list of resources to go to for more information.

How to use the CD

You can use this CD in a variety of ways depending on your interest, your comfort level with the information, interests of your audience, and more. It is designed so you can use scripts of each themed interpretive walk or put together your own talk drawing from the resources included here. Embedded within each of the interpretive walk scripts are links to more information about the topic being discussed, as well as to maps and photos. Print scripts and photos to take with you; explore the resources to learn more about the history and natural history of Newaygo County, Michigan and Loda Lake Wildflower Sanctuary, and about the US Forest Service.

Introduction to Interpretive Walks

Each of these two interpretive walks addresses a different aspect of Loda Lake. One focuses on the natural communities found here, and some of the plants and animals that occupy them. The other focuses on the history of the area. Feel free to combine all or parts of them.

The scripts are formatted as talking points rather than scripts to be recited verbatim. One reason is so you can incorporate the talking points into your own speaking style. Another is that what you will see along the trail changes with the season and it would be unwieldy to incorporate every bit of information – the script would be very long! For that reason, the talking points include links to the background information contained on the CD. This allows you to customize each script to your needs. If you want more of the detail to take with you, you can cut and paste what you need into the script, where you need it. The more often you give a particular walk, the less you will need to rely on these notes.

Tips for leading guided walks

The following tips and techniques will help both you and your audience get the most out of their visit.

- Resist the urge to talk while walking. Plan your walk – what topics you want to cover at what points on the trail – then talk only when you have stopped. Make sure the entire group is gathered and that they can hear you and see any objects or photos you have brought with you.
- Encourage questions while you are stopped. Invariably a few people near the front of the line will ask a question, and the temptation will be strong to answer it. A good way to handle that is to acknowledge the question, and:
    - If it is a general question, let the person know you will answer it at the next stop so everyone can hear the answer. When you get to the next stop, repeat the question and answer it before starting the next topic.
    - If the question pertains to something along the trail, such as identifying a flower in bloom, stop then and respond. Then instruct people who have heard the discussion to move ahead a short way and wait for you. Once everyone has passed by, resume the lead and continue on the walk.
- A corollary to the above is to let visitors enjoy their own thoughts and make their own observations as they walk between stops. Let them absorb the atmosphere of the wildflower sanctuary.
- There are so many interesting stories that can be told about Loda Lake, that it's tempting to tell them all in one walk. Keep in mind that your audience will remember more if the information you give them is organized around a unifying theme or overarching story. The two scripts are examples of this.
- Be flexible. You may end up spending more or less time at a given stop than you had planned. Just be mindful of the time available to the group and adjust accordingly. If you end up having to leave something out, remember that you are the only one who knows that – your audience doesn't have your script or know where you plan to stop.

- Take advantage of the teachable moment. Nature is not predictable, and it is likely you or your participants will find something that sparks a question or discussion. Find ways to work that moment into your theme. For example, if someone finds a frog on the trail, you can talk about what kinds of habitats frogs need (water, for one) and relate it to the habitats at Loda Lake. If you don't feel comfortable doing that, simply enjoy the moment with your audience, and then move on.
- Be sure to end your walk when you said it would end. In other words, if the end time is 10 a.m., make sure you are back in at the picnic area at 10 a.m. The exception to this is if you have the group's permission to continue beyond the end time. You may have some in the group who need to leave at the stated time, while others can stay. In that case, complete the walk so those who need to leave can, and let the others know you will stay awhile longer to answer questions. Of course, if you need to leave, you don't need to apologize for ending on time.
- It is also okay if a walk ends earlier than the scheduled time. Don't feel you have to stay out until the stated end time if you have covered the material you want to cover and the participants have no further questions.

Geology and soils
This area, like most of Michigan, has been shaped by the massive continental glaciers that scoured the Midwest during the great ice age. The last ice sheet, the Wisconsin Glacier, covered the area about fourteen thousand years ago. The ice acted as a giant bulldozer, scraping millions of tons of earth as it moved. As the ice retreated, it deposited a mix of soils and rocks, creating vast areas of sand, silt and clay called outwash plains, and low hills called moraines.

Soils found at Loda Lake are sandy, permeable – they don't hold water – and are very dry and erode easily. The soils here once supported a vast forest dominated by white oak and white pine. Once the timber was cleared, the soils were subject to erosion. We know from the history of the area that the area is not suited to many farming practices and the area was declared unfit for cultivation in 1937. Once the Forest Service took possession of the property they quickly planted red pine to stabilize the sandy soils.

While the sandy soils support the forest at Loda Lake, they do not provide a firm anchor for tree roots. As a result, strong winds can blow trees down in what are called windthrow events. The downed trees around Post 5 may be a result of just such an event.

Natural communities
Loda Lake Wildflower Sanctuary is rich in plant species because it encompasses many different natural communities: a spring-fed lake, several types of wetlands including a bog and marsh, oak forest, a pine plantation, and an old farm site.

Natural communities are like human communities. They are made up of – and are defined by – the particular groups of plants and animals found in them. Plants, in turn, are dependent on particular soils, topography, geology, climate, and more. Scientists describe natural communities based on many of those same factors.

At Loda Lake Wildflower Sanctuary, what looks like one forest to us is really a mix of different types of forest natural communities. You can see this by noting where different trees grow. For example, beech and maple trees grow in only a few places at Loda Lake.

Savanna
The best way to describe a savanna is to think of a park with widely spaced trees and lots of grass. Another way to think of it is as a prairie with tress. The understory is filled with native warm season grasses (grasses that grow actively in summer), and wildflowers. They are a haven for nectar-loving insects, as well as songbirds that feast on both insects and seeds. Scientists describe several types of savannas in Michigan; oak barrens, oak-pine barrens, and pine barrens are all types of savanna.

Historically, this area might well have supported pockets of oak-pine barrens, which are found on well-drained, sandy glacial outwash. True savannas are rare today, and so are a few of the plants and animals that occupy savanna habitats. One of these is the federally endangered Karner blue butterfly.

These natural communities are fire dependent ecosystems and their loss is due to fire suppression efforts, incompatible land uses and human development. Before European settlers arrived, fire was an important process in maintaining prairies, savannas, and barrens. Periodic fires killed trees and shrubs that invade open spaces and shade out plants beneath. These fires allowed ground forbs like wild lupine, butterfly weed and coreopsis to grow.

The Forest Service is managing the area near the old farm site as a savanna. They conduct prescribed burns**,** and are planting savanna grasses and wildflowers such as June grass, prairie smoke, milkweed and wild lupine. This area serves as a demonstration of ways to attract butterflies and other nectar-loving insects and birds.

Forest Natural Communities

At Loda Lake Wildflower Sanctuary, what looks like one forest to us is really a mix of different types of forest natural communities. You can see this by noting where different trees grow. For example, beech and maple trees grow in only a few places at Loda Lake.

Mesic northern forest
Beech and maple trees are representative of the natural community called a *mesic northern forest*. The term *mesic* refers to the amount of moisture in the soil; a mesic habitat has a moderate amount of moisture – not too much or too little. The soils are loam to sandy loam and acidic (pH lower than 6). In addition to beech and maple, mesic northern forests include hemlock, paper birch, red oak, and white pine.
Common wildflowers: Jack-in-the-pulpit, violets, sensitive fern, lady fern, royal fern. In wetter sites: blue lobelia, jewelweed.

Dry-mesic northern forest
The other main forest natural community at Loda Lake is the *dry-mesic* northern forest. Another name for this community is pine-hardwood forest and this name is a good description of the kinds of trees you'll find. This part of Michigan was once covered by these vast forests dominated by white pine and white oak. Most of the white pine was removed during logging in the late 1800s and today there are more oak than pine. As the name implies, dry-mesic forests have drier soils and the soils are very acidic (pH below 5). Blueberries thrive on acid soils and you can expect to find them in the understory. In addition to white oak and pine, dry-mesic forest trees include red pine, hemlock, red maple, and several other oak species, all of which are found at Loda Lake. Before settlement by Europeans, this type of forest was maintained by frequent fires that were low in intensity.
Common wildflowers: columbine, false Solomon's seal, Hepatica, blueberry, partridgeberry, starflower, pipsissewa, sweetfern, pink lady's slipper, wintergreen, wild lily of the valley, blue bead lily bunchberry, Indian pipe.

Wetlands

A variety of wetland natural communities contribute to the wildflower diversity at Loda Lake. Scientists have different names for these natural communities that are described by soils, amount of water, and vegetation. At Loda Lake, these sites merge into and interconnect with each other. Following are descriptions of several wetland natural communities that occur here.
Common plants: marsh bellflower, swamp rose, swamp milkweed, marsh fern, royal fern, sensitive fern, round-leaved sundew, cattails, cinnamon fern, marsh marigold, swamp dewberry.

Emergent marsh
Plants characteristic of this natural community, like cattails, are rooted in the soil beneath the water, while the tops of the plants emerge above the water's surface – hence the title *emergent marsh*. Emergent marshes are shallow water wetlands that often occur at the shores of lakes and streams. Common plants: cattails, pickerel weed, a variety of sedges and rushes.

Bog
Bogs often occur on the margins of lakes and ponds. They are characterized by floating mats of Sphagnum peat moss and/or sedges. At Loda Lake, parts of the lake margin, especially near trail post 12 a, are bog-like. Typical bog plants include sphagnum mosses, cranberry, and sundew and pitcher plant, both of which are carnivorous plants.

Northern shrub thicket
Shrub thickets are like marshes dominated by shrubs. They are often found near streams, and sometimes near lakes. The soils are muck or peat and acidic. As a result, they have some of the same plants found in bogs, such as cranberry. The common dominant shrub is tag alder. The wetland through the boardwalk at Loda Lake has been changing over time from a marsh dominated by cattails to a shrub thicket dominated by alder and willow. On drier hummocks you can find swamp rose, cinnamon fern, and royal fern. Pitcher plant has also been found in the area of the boardwalk.

Pine plantation
The red pine plantation, while not a naturally-occurring natural community, is worth noting. The pines were planted by the Civilian Conservation Corps when the Forest Service took possession of the property. Soil erosion was a big problem after the timber was cut and after farming. The Forest Service operated a large tree nursery in Michigan at which it grew seedlings for reforesting the state. Red pines were planted to stabilize soils because they are adaptable to a variety of soil types and are easy to.

As it turns out, the plantation occurs on some of the richer soils and we're now beginning to see the natural community coming back. Woodland sunflower is common, though often not seen because the deer chew it off. Maple, beech and ash trees that would normally occupy the site have come in under the pines.

The Importance of Pollinators
Pollinators are critical to the health and propagation of wildflowers. Most flowers need insects to move pollen from one plant to another in order to produce viable seeds. While not native to North America, honey bees have become important pollinators of many species, including most agricultural crops. Many kinds of native bees, as well as butterflies, flies and even birds are also important pollinators. The Forest Service takes into account the need for pollinators in their management at Loda Lake Wildflower Sanctuary and other sites. In the savanna area near the old farm site they have planted four different species of milkweed to attract Monarch butterflies, as well as other wildflowers for honey bees and other insects.

Animals

American (pine) marten
American martens are members of the weasel (*Mustelidae*) family. They are related to weasels, mink, skunks, otters and badgers. Little is known about the habits of American martens since they can be active at night and usually are shy. Once present in the Lower Peninsula, American martens have been absent from this part of the state until recently. Animals have been reintroduced in the Ward Hills area and radio telemetry data indicates they are dispersing. So it is possible, though not likely, to see them at Loda Lake.

American martens are long, slender animals. Claws are sharp and curved. They are 21 to 26 inches in length, including the long, bushy tail and weigh 1.5 to 2.75 pounds. The fur is long and shiny. The head is gray, legs and tail are very dark brown or black, the chest has a cream colored patch, and the back is light brown. Their claws are semi-retractable like those of cats which aid them in climbing trees. Eyes are large, and ears are cat-like. They also have very large foot pads in relation to body weight allowing them to walk on hard snow.

Martens are found in mature conifer and mixed hardwood forests. They den in hollow trees, crevices or vacant ground burrows. Adult martens live in an area of about 2 to 4 square miles.

They live in the northern reaches of North America in parts of Michigan, Minnesota, Wisconsin, Maine and New York. The species is present from Newfoundland and Nova Scotia west to Alaska and south into sections of the Rocky Mountain range and California.

Martens are opportunistic feeders. Their diet consists primarily of small mammals, including squirrels and rodents. They also eat birds, fruit, nuts, insects and carrion. Martens kill their prey with a quick, powerful bite to the back of the neck. They sometimes have wild chases in trees with red squirrels, a favorite prey.

Martens were eliminated from Michigan around the 1930s, due to removal of mature evergreen forests and unregulated harvests. Recovery efforts began in 1958, and martens were removed from the state endangered species list in 1999.

Cool facts

- Martens can live for up to 17 years in captivity. Although wild martens do not live as long as those in captivity, wild females can still breed at the age of 12 years.
- During cold weather, martens have a hard time keeping warm, so they tunnel deep under the snow into tangles of tree roots for warmth.
- Martens often visit bird feeders during winter to hunt the birds that visit the feeders.
- Young martens may be vulnerable to large carnivores including wolves or owls.

Great blue heron

Great blue herons are the largest and most widespread type of heron in North America. At Loda Lake, you'll likely see them along the water's edge, spearing fish with their long beaks. Loda Lake lies near the border of the herons' summer and year-round ranges.

Great blue herons live along calm freshwater and seacoasts. Usually they nest in trees near water by building a platform of sticks, but colonies (rookeries) can be found away from water. While great blue herons visit Loda Lake, they do not nest here.

Great blue herons feed in shallow water and on land by stalking prey. They feed in deeper water by plunging or swimming. Foods include fish, invertebrates, insects, amphibians, reptiles, birds and small mammals.

Cool facts

- Great blue herons have been known to choke to death trying to eat fish that are too large to swallow.
- They can cruise at 19 to 29 miles per hour.
- Males select a new mate each year, and together they build a nest for three to five eggs.
- Herons can live up to 17 years.

Ruby-throated hummingbird

The only species of hummingbird that breeds in eastern North America, the ruby-throated hummingbird is found throughout deciduous and mixed forests, largely in the East and Midwest. They are nectar feeders and are attracted to red flowers such as columbine. Listen for the buzzing sound of its wings as it flashes and flits around Loda Lake.

Ruby-throated hummingbirds breed in mixed woodlands and eastern deciduous forests, gardens and orchards from central Alberta eastward to Nova Scotia, southward from eastern North Dakota to eastern Texas and Florida. They leave Michigan in the fall, heading south to their wintering grounds in southern Mexico and Central America south to Costa Rica. They fly nonstop across the Gulf of Mexico to reach Central America. They winter in tropical deciduous forests, tropical dry forests, scrubland, citrus groves and second growth.

They feed on nectar, small insects, and tree sap. They hover at flowers and sap wells, catch insects in flight and pluck them from leaves. They will even pick spiders from webs.

Cool facts

- A ruby-throated hummingbird's wings beat 53 times a second.
- Their extremely short legs prevent them from walking or hopping. The best they can do is shuffle along a perch. Nevertheless, they will scratch their head and neck by raising a foot up and over their wing.
- They don't show a strong preference for any particular color of feeder. Instead, they prefer specific feeder locations.
- Their nests are an open cup placed on top of small tree branch. Nests are made of thistle and dandelion down, held together with spider web and covered on outside with lichens. Hummingbirds place their nests at an average of 10 to 20 feet height. Eggs are white and about ½ inch x 1/3 inch. Nests usually contain two eggs. Incubation takes about two weeks, and chicks fledge in 18 to 20 days.

Pileated woodpecker

Nearly as large as a crow, the pileated woodpecker is the largest woodpecker in most of North America. Its loud ringing calls and rectangular excavations in dead trees announce its presence in forests surrounding Loda Lake.

This woodpecker is found year round at Loda Lake. It lives in deciduous and coniferous trees throughout the East and Midwest, westward to eastern North Dakota and eastern Texas. Pileated woodpeckers also live along Pacific Coast and northern Rockies and into southern Canada.

Woodpeckers glean insects (primarily carpenter ants and wood-boring beetle larvae) from branches, trunks and logs. They also eat fruits and nuts. Woodpeckers make deep rectangular excavations in trees and logs and pry off long slivers of wood to expose ants.

Cool facts

- Woodpeckers' feeding excavations are so extensive that they often attract other birds to feed there.
- They prefer cavities in large trees for nesting. In young forests that have been harvested for wood, woodpeckers will use any large trees remaining. Because these trees are larger than the rest of the forest, they present a lightning hazard to nesting birds.

Red-winged blackbird

Red-winged blackbirds are common in the marsh areas at Loda Lake. One of the most abundant birds in North America, they are found all over the U.S.. The male's brilliant red shoulder bands and the trill of their song make them easy to recognize.

Blackbirds breed in wetland and grassy areas, including marshes, meadows, alfalfa fields and open patches in woodlands. Their summer range (which includes Loda Lake) extends from southeastern Alaska across Canada and the U.S., southward to Central America. They are found year-round in much of the U.S.

Blackbirds probe in vegetation and under objects for insects. They glean seeds from ground.

Cool facts

- Red-winged blackbirds are highly polygynous, with one male having up to 15 females making nests in his territory. In some populations, 90 percent of territorial males have more than one female. However, 25 to 50 percent of the young in nests within his territory aren't his. They have been sired by neighboring males.
- Males fiercely defend territory during the breeding season. They may spend more than 25 percent of daylight hours in defense. They vigorously keep all other males out of the territory and defend nests from predators. They will attack larger animals, including horses and people.
- They form roosting congregations in all months of the year. In the summer, blackbirds roost in small numbers at night in wetlands where they forage and breed. In winter, they can form huge congregations of several million birds, congregating in the evening and spreading out each morning. Some may travel as far as 50 miles between the roosting and feeding sites.

White-tailed deer

Of all North America's large animals, the white-tailed deer is the most widely distributed and numerous. Look for white tails feeding in the morning or evening in fields around Loda Lake. You also can look for deer sign:

- **Bedding areas:** Deer bed down in hollows and meadows where ground is dry, level and grassy. A flattened area several feet in diameter is an indication.
- **Rubbings:** In the late summer and fall, a buck will rub the velvet off its antlers on saplings. Look for shredded bark a couple feet from the base of the tree. Bucks also will rub to strengthen neck muscles and leave scent. Generally, the bigger the rub, the bigger the buck.
- **Hoof prints and trails:** Prints of does and bucks are indistinguishable, but prints and well-used trails should show you preferred terrain.
- **Droppings:** Look for small piles of oblong to round, dark pellets, slightly smaller than a marble (not to be confused with smaller rabbit pellets).

White-tails live in every habitat, but are considered a forest species, living on woodland edges.

During the spring and summer, diet consists of leafy material from woody plants, grasses, herbs and forbs. It also includes such delicacies as fiddleheads and mushrooms. In autumn, white-tails depend on acorns and twigs within reach.

In the U.S., white-tails occupy more habitats over a greater range and in larger numbers than ever before. At the start of the 20th century, they were almost eliminated in a number of states, but reintroduction programs allowed populations to rebound. Due to changes in habitat and decreases in predators and competition, white-tails can over populate. Hunting is used as a main method of controlling over-population.

Cool facts

- There are more whitetails today in the U.S. than when Christopher Columbus discovered the new world.
- Large populations can impact an area's vegetation and increase the likelihood of car accidents.
- White-tails are strong swimmers and have been clocked at 13 miles per hour for three miles.
- A doe will leave her fawn unattended for hours at a time. When a fawn remains bedded, its spotted coat and almost scentless condition effectively conceal it. The doe returns at intervals to suckle the fawn. People sometimes find fawns in their hiding places and believe they have been deserted. In fact, a doe will rarely desert her fawn, and the little animals should not be touched.

Wild turkey

Few sights are sweeter than glimpsing a hen turkey leading her brood as they hunt and peck behind her. While they are elusive, you might see turkeys any time of year at Loda Lake. Listen for their distinctive gobbles, yelps and clucks.

Around Loda Lake, turkeys are found in hardwood forests with scattered openings. The range of the species extends from very southern Canada southward into Mexico and Florida; scattered populations exist in the West.

Turkeys scratch to uncover acorns, nuts, seeds, fruits, insects, buds, fern fronds and salamanders.

Cool facts

- Males gobble to attract females. When a female appears, the male struts around her. He fans his tail and holds it vertically, lowers his wings so that the wingtips drag on the ground, raises the feathers on his back, throws his head back onto his back with the bill forward, and inflates his crop. He makes occasional deep "chump" sounds, followed by a low "hum" and accompanied by rapid vibrations of tail feathers. During the strut, his facial skin engorges and the colors intensify.
- Male wild turkeys provide no parental care. When eggs hatch, chicks follow the female. She feeds them for a few days, but they quickly learn to feed themselves. Several hens and their broods may join up into bands of more than 30 birds. Winter groups can exceed 200.
- In the 1940s wild birds were caught and transported to new areas, where they quickly became established and flourished. Introduction programs have successfully established turkey in most of its original range, and even into areas

where it never occurred before. Transplantations are responsible for the spread of the wild turkey to 49 states (except Alaska).
- Mature males are called toms. Young males are jakes. Females are hens.

Karner blue butterfly

While not found at Loda Lake, the federally endangered Karner blue butterfly has been found nearby. The Forest Service manages for one population just north of Highway 20, south of Loda Lake, and the butterflies have also been seen north of the area.

Karner blues lay their eggs only on or near lupine plants and the caterpillars eat only lupines. The host lupine occupies savannas, which have become very – one reason the Karner blue is endangered.

Karner blues are small butterflies about the size of a nickel. Males have a vibrant, silvery blue color on the upper surface of their wings. Upper surfaces of the females' wings are blue close to the body, fading to grayish-brown towards the edges. The wing undersides of both sexes are light gray to grayish-brown with rows of small black spots. A single row of spots (metallic blue-green, orange and black) rims the outer edges of the underside of each wing. Caterpillars are small, green and soft-bodied.

Two generations of Karner blues are produced every year. The first hatch occurs from mid-May through early June. These butterflies lay eggs which hatch and become adults for a second hatch from mid-July through early August. Adult butterflies live for one to two weeks.

Butterflies currently are present in at least 10 southern Michigan counties -- Allegan, Ionia, Kent, Lake, Mason, Mecosta, Montcalm, Muskegon, Newaygo, and Oceana -- though other counties still contain potential habitat.

Karner blues are federally listed endangered and listed as a Michigan threatened species. Once ranging from Maine to Minnesota, the Karner blue has been reduced to small populations in Indiana, Michigan, Minnesota, New Hampshire, New York and Wisconsin.

In Michigan, the historical distribution of Karner blues was widespread in the western and southern Lower Peninsula, but populations declined as the amount of available habitat was reduced. Today the Karner blue persists in remnants of savannah and barrens, degraded openings, old fields, and utility and highway rights-of-way.

Efforts are underway through the Michigan Department of Natural Resources and conservation partners to restore Karner blue habitats in Michigan and Ohio. For more info on Michigan conservation efforts go to http://www4.gvsu.edu/karnerblue.

Cool fact

- Karner blue caterpillars have a mutual relationship with mound-building ants, which protect the caterpillars from predators and parasites. In exchange, the caterpillars excrete a sugary substance which is consumed by the ants.

Muskrat

The muskrat is not really a rat. It is the most common herbivore in Loda Lakes' wetlands. The muskrat and its bigger cousin, the beaver, are the only mammals that actually build homes in the water. Muskrats live in areas from northern North America to the Gulf coast and Mexican border.

The muskrat is about the same size as a cottontail rabbit. Adults range from 16 to 25 inches in length and weigh from 1.5 to 4 pounds. Muskrats have small eyes and ears. Their front legs are short while the hind legs are longer and have partially webbed feet. The black, scaly tail is flattened vertically (like the rudder of a ship) and is almost as long as the body. The back is dark and fades to a lighter brown with a reddish tinge on the sides. The underparts are lighter, shading to almost white on the throat.

The muskrat is found throughout Loda Lake's wetland areas. It lives in marshes, ponds and streams that have many water plants. Several hundred muskrats can live in a single wetland.

Those that live in areas with shallow, stable water (like marshes) often build dome-shaped houses by cutting and piling up cattails, bulrushes or other aquatic vegetation. Muskrats that live in rivers, ditches and ponds usually don't build houses. Instead, they burrow into banks, beginning underwater and angling upward until a tunnel clears the water level. Here they hollow out a living chamber. Trails created by swimming in and out of den entrances are sometimes visible.

In marshes, muskrats eat roots and stems of cattail, bulrush, arrowhead, duckweed and water-lily. Clover, corn and grasses are common foods in agricultural areas. Muskrats sometimes eat freshwater clams, snails, crayfish, fish and frogs. Feeding piles often accumulate where muskrats eat their meals.

Muskrats communicate by a secretion from their glands called musk. Musk also serves to warn intruders. They vocalize by squeaks and squeals. They have poorly developed sight, hearing and smell.

Cool facts

- Muskrats consume about one-third of their weight every day.
- Muskrats are excellent swimmers and can evade predators by escaping into water or burrows and nests. They can remain under water for up to 15 minutes.
- Muskrats' main predators are mink and otters. Raptors such as eagles and ospreys will attack swimming muskrats. On land, muskrats are vulnerable to predation by foxes, coyotes and raccoons.

- Unlike beavers, muskrats do not store food for the winter. They need to eat fresh plants each day and sometimes make channels in the mud to get from their homes to reach food under the ice. To stay warm in winter, groups of muskrats huddle together in their lodges.

Plants

Pitcher plant *(Sarracenia purpurea [purpurescens])*
Pitcher plants harvest their prey differently than sundews. They use an elaborate pit-trap method. Flies, attracted to the hollow leaf by color and the smell of decaying prey, find themselves on a waxy surface that leads to a pool of water. Flies have wings and should be able to fly out of the trap; however, the plant supplies a wetting agent that wets the fly's wings so it can't fly! The inside walls are so slippery, that even a fly's feet can't stick to them, and the fly slides down to the bottom of the leaf where it is digested. Pitcher plants have been found by the boat ramp.

Sundew *(Drosera rotundifolia)*
Sundew leaves act like sticky fly paper. Insects become trapped by the sticky hairs on the leaves. Those hairs produce digestive juices that decompose the trapped prey. The diminutive sundew doesn't look like it could eat much, but it is reported that one researcher counted insects trapped in a sampling of plants in England and estimated that about six million insects were trapped in a bog of about two acres! Of course, there were many more sundews in that bog than at Loda Lake. Sundews grow under and around the bench near Post 12a.

Trailing arbutus *(Epigaea repens)*
Trailing arbutus figures into the human history at Loda Lake. When the Hanson's owned the property that is now Loda Lake, Mr. Hanson made a special trip each year to collect large amounts of it, pack it in ice from Mr. Hunt's ice house, and take it to his friends and colleagues in Chicago. Mr. Hanson was not alone; trailing arbutus, an evergreen, is often collected for wreaths and winter decorations. In fact, over collection is a threat to trailing arbutus in some areas, nearly eliminating the plant from Massachusetts at one time, though it is common through most of its range. In Michigan it is protected under the Christmas greens act (Natural Resources and Environmental Protection Act 451 of 1994.

The plant is low-growing, and forms a mat across the ground. It has beautiful, fragrant flowers that bloom in the early spring. It does best in sandy, acidic soils, and is often found growing in the same places as wild blueberry. It was common in the white oak-white pine forests that once covered this part of the state. When found in oak forests, it serves as a clue that pines were once part of the forest.

Trailing arbutus has been in cultivation for more than 200 years, even though it is a challenge to grow. Scientists believe the plant requires a mycorrhizal association – a relationship between a fungus and the plant roots that helps the plant absorb nutrients – in order to survive and grow.

In addition to its aesthetic qualities, trailing arbutus is useful to both wildlife and people. It attracts bumblebees, its main pollinator, and butterflies. It is a host plant for the hoary elfin butterfly. It is reported to have been considered sacred to the Forest Potawatomi, who considered the flowers sent directly from their divinity. Iroquois used trailing arbutus as a medicinal plant to treat a variety of conditions including rheumatism, kidney ailments and labor pains.

Cool fact

- Trailing arbutus is also called Plymouth Mayflower. It is reported to be the first flower to cheer the hearts of the Pilgrim Fathers after the rigors of their first New England winter.

Witch hazel *(Hamamelis virginiana)*
Witch hazel is a common understory tree at Loda Lake. Its small yellow blossoms appear in the late fall or early winter; you might smell their delicate fragrance as you walk the trails.

Witch hazel has been used by humans for thousands of years. The bark and leaves have astringent properties. Astringents cause tissue to contract when applied and are typically used to protect the skin and reduce bleeding from minor cuts and abrasions. The Cherokee rubbed witch hazel leaves on scratches, and made an infusion by boiling the leaves and bark. The infusion was applied externally as a lotion for dry skin, and they also took it internally for a variety of ailments including colds and tuberculosis. Witch hazel is still an ingredient in many astringents sold commercially today.

Cool fact

- Native Americans and pioneers used the forked braches as dowsing rods to find water or minerals.

Blueberry *(Vaccinium angustifolium)*
Blueberries are one of a number of plants in the heath family *(Ericacea)* that are often referred to as "ericaceous shrubs." Cranberry is another. Most ericaceous shrubs thrive on very acidic soils and so do well in this part of Michigan. It's a treat to sample ripe blueberries as you walk along the trail in the summer; That is, if you get to them before the animals do. Wildlife, including bears, love to eat wild blueberries as much as people do.

Poison sumac *(Toxicodendron vernix or Rhus vernix)*
Poison sumac is related to poison ivy and poison oak, and like them, causes an itchy rash in many people who come in contact with the plant. The rash is caused by exposure to an oil called urushiol, which is found in all parts of the plant. The rash is contracted only by direct contact with the oil. That doesn't necessarily mean direct contact with the plant; you can pick up the oil from clothing, gardening implements or pets that have been in contact with the plant. Not everyone reacts to urushiol, though anyone can develop sensitivity at any time, so it's best to avoid the plant. If you are exposed to poison sumac or its relatives, you may be able to limit or prevent a reaction by washing with soap and

water within 30 minutes of exposure. It is unusual to find this species this far north in Michigan.

Invasive Exotic Species
Invasive species are those that are not native to a given ecosystem and whose introduction will cause harm to humans and natural communities. They can be plants, animals, and other organisms such as microbes. Most ecologists agree that overall, invasive exotic species of plants and animals have reduced the biodiversity of most ecosystems in the U.S. Invasive exotic plants usually crowd out the native plants in a given area. Instead of having many species of plants that provide food and cover to pollinators and other wildlife, an area is left with only one species, and that one species usually has little value to wildlife.

There are three primary ways to control established infestations of invasive exotics:

- *Biological control* uses a plant's natural enemies to control its growth and establishment. This can be very effective, though in some cases newly released biological control organisms have themselves become invasive, sort of a "backfire" in attempting biological control.
- *Mechanical control* involves physical removal of weeds; mainly by chopping, pulling, and burning. This is a method most of us use in our own back yards.
- *Chemical control* involves the use of herbicides, which are chemicals that interfere with the physiology of plants to slow their growth, prevent them from producing seeds, or to kill them.

Autumn olive *(Eleagnus umbellate)*
Autumn olive was introduced to the U.S. in 1830 as an ornamental shrub, to provide food and cover for wildlife, and for erosion control. In the 1940's and 50's it was recommended by many fish and wildlife agencies for its wildlife values. Unfortunately, at that time scientists did not know that it would become invasive. Now we know that autumn olive crowds out important native plants that are even more useful to wildlife. The Forest Service is using chemical control methods to eradicate this shrub from Loda Lake. It's a difficult battle, though, because autumn olive grows near the Sanctuary and it grows from seeds left by birds.

Periwinkle *(Vinca minor)*
Periwinkle, a low-growing vine, was introduced to the U.S. from Europe many decades ago to use as an ornamental groundcover. It has escaped cultivation and is invading natural areas in at least 36 states, including Michigan. The qualities that made it attractive to gardeners as a groundcover are the very characteristics that make it invasive: it grows vigorously, forms a dense groundcover, and spreads rapidly. Because it forms dense mats, it crowds out native wildflowers and other native plants.

Before it was known to become invasive, periwinkle was planted in several places at Loda Lake after the property became a wildflower sanctuary. The Forest Service has been actively working to remove it from the area. At one time periwinkle completely

covered the ground between posts 1 and 2. Control efforts have removed most of those plants. There are also a few plants between posts 35 and 39.

Purple loosestrife (*Lythrum salicaria*)
Purple loosestrife came to the U.S., probably in ships' ballast, in the late 1800's. It commonly infests freshwater and brackish wetlands. This plant is particularly destructive in wetland where it replaces plants by native animals for food and cover. Purple loosestrife destroys hunting and recreational wetlands, again by replacing native vegetation. Plants multiply rapidly; each plant produces over 2 million seeds, and it also spreads vegetatively. It is a good nectar source for honey bees, and is also grown as an ornamental. However, its detriments outweigh its benefits.

Spotted knapweed *(Centaurea biebersteinii)*
Spotted knapweed was accidentally introduced into the U.S. in the late 1800's, probably through ballast in ships or in shipments of other seed. As with autumn olive and purple loosestrife, spotted knapweed crowds out native plants. The Forest Service is controlling this plant pulling up the plants. Beekeepers are fond of this plant because the "star thistle" or "star flower" honey that is made from this plant is a favorite honey of many.

Chief Simon and Princess Loda

Chief Simon Pokagon and Princess Loda are two Native Americans who dearly valued nature, wildlife and wildflowers, particularly in Michigan, their home. Chief Pokagon, one of the lasts full-blooded Potawatomi chiefs, was born in 1830, in an Indian Village near Niles, Michigan. It was Simon's father whose scrawled signature on a treaty at Tippecanoe River, Indiana, on Sept. 26, 1833 gave the site of Chicago into the possession of the whites for 3 cents an acre.

Pokagon was considered a literary genius and was one of the most educated Native Americans of his time having studied for a number of years at Notre Dame du Lac in South Bend, Indiana, and other colleges. He had a fierce love of nature and expressed that love in writing. Pokagon wrote one book, ***"Queen of the Woods***," a story of his early courtship with Lodinaw, his wife. This book, published originally on birchbark, is full of native imagery and love of nature in the forest woodlands of Michigan:

"In early life, I was deeply hurt as I witnessed the grand old forests of Michigan, under whose shades by forefathers lived and died, falling before the cyclone of civilization as before a prairie fire. In those days, I traveled thousands of miles along our winding trails, through the unbroken solitudes of the wild forest, listening to the songs of the woodland birds as they poured forth their melodies from the thick foliage above and about me. Very seldom now do I catch one familiar note from those early warblers of the woods. They have all passed away… I now listen to the songs of other birds that have come with the advance of civilization ... and, like the wild wood birds our fathers used to hold their breath to hear, they sing in concert, without pride, without envy, without jealously - alike in forest and field, alike before wigwam or castle, alike before savage or sage, alike chief or king."

Pokagon's wife, Princess Lodinaw (Angeline Pokagon), was also particularly sensitive to nature and animals, which seemed drawn to her. She died soon after attempting to rescue their son, who drowned. She is buried at the Walnut Hill Cemetery near Hartford, MI.

Harvesting timber resources

The area known today as Loda Lake Wildflower Sanctuary has a long and varied history. We know a lot about the history, though there are still gaps in our knowledge and we continue to learn about its past.

This story begins in the late 1800s when lumbering of the old-growth (also called virgin) timber changed the natural landscape. Once a vast oak-pine forest, the area was almost completely cleared. One account describes the land as "stripped of timber…and largely strewn with decaying pine logs and stumps as large as 4 feet in diameter." Standing in the forest today, it's difficult to imagine the area without trees.

Various accounts place ownership with the West Michigan Lumber Company while others list the Pere Marquette Railroad. During that time, most of the trees were harvested to provide lumber for railroad ties. Like much of Michigan at that time, the area was almost completely cleared**.**

Farming the land

Mr. Hanson considered the property to be worthless acreage, asserting that "no one could make anything grown on that sand." Thomas E. Hunt worked for the Steger Piano Company in Steger, IL and was an acquaintance of Mr. Hanson. He challenged Mr. Hanson's assertion with the boast that he could farm any soil. They made a bet, and the Bass Lake Farm was created.

Mr. Hunt farmed the area from 1909 to 1916. He first had to remove all the remaining pine stumps, which he did by hitching each stump to a yoke of oxen, pulling it out by the roots, and dragging them to the borders of the planned fields. This was no mean feat as some of the stumps were reported to be as large as four feet in diameter! Hunt built a four-room house; a large sheep barn; a modern hip-roof barn with 12' x 12' timber framing; a milk house; an ice house; a bunk-house for farm hands; a windmill and water tank; and a chicken house. He planted peach and apple orchards, and grew navy beans, corn, millet and alfalfa, and oats.

True to his boast, the land flourished under Mr. Hunt's farming methods. An early proponent of scientific farming, Hunt knew that nutrients taken from the soil had to be replaced, which he did with manure, lime, resting fields between crops, and growing legumes, which fix nitrogen in the soil. Under his care, Bass Lake Farms produced a comfortable living for his family, while other farmers in the area lived hand-to-mouth.

The Hunts moved to Oregon in 1916 to provide relief to Mrs. Hunt's allergies. A succession of families farmed the area, none as successfully as Mr. Hunt. Charles Elvey farmed from 1916-1920; Richard Townsend rented the farm from 1920 to around 1926; and Roy and Katie Ditlow farmed the property from around 1926 until it's sale to the Forest Service in 1937.

The Hansons

Sometime in the early 1900s, Frederick P. Hanson, his wife Bessie Beers Hanson, and their daughter Marjorie, acquired 5,000 acres of land to the east, north and south of the Lake through a series of purchases by both the Hanson and Beers families. At that time, the lake was called Bass Lake. The Hanson family owned the property until Marjorie sold it to the Department of Agriculture around 1937 for $3.00/acre.

The Hansons, who lived in Chicago, used the land mainly as a summer home and vacation spot, and for hunting in the spring and fall. Mr. Hanson considered it "worthless acreage" for anything else. In 1910, Mr. Hanson built a summer home over looking the lake. It was a substantial home: 40' x 100' with an 80' porch, a formal rose garden, and lilac hedges. The home was staffed each summer by a cook, gardener, maid, and a manservant. No trace of this substantial home exists today; the parking lot and picnic area are thought to occupy the homesite.

Mr. Hanson brought friends to the home each fall to hunt ruffed grouse, which were common on the property at that time. Mr. Hanson used another resource from the site. Each year he made a special trip to gather trailing arbutus by the bushel to ship to his friends in the city.

The Hanson's daughter, Marjorie, met and married an artist, Albert H. Schmidt. The family took a trip to Europe to meet him prior to the marriage. Mr. Schmidt managed to be delayed meeting them, causing the family to postpone their trip home – a good thing, as their return passage was booked on the Titanic! In gratitude, Mr. Hanson built an artist's studio for his son-in-law. The studio foundation remains on the property and gives a clue to how different the forest is today: when the studio was built it had a good view of the lake; today, the lake is barely visible through the trees.

The Wildflower Sanctuary

In 1937 the Department of Agriculture declared the area sub-marginal and unfit for cultivation. The Forest Service acquired the property from Marjorie Hanson Schmidt for $3.00/acre in 1937 and it was made part of the Manistee National Forest. In order to stabilize the sandy soils, the Civilian Conservation Corp planted a red pine plantation.

In the mid-30's, members of the Garden Clubs of Michigan began looking for a place to serve as a sanctuary for wildflowers and other native plants. The former Hanson property on Bass Lake was known to them as a place that harbored a wide variety of wildflowers. The details of who initiated the discussion are unclear, but in 1938 the Forest Service and the Garden Clubs of Michigan began exploring the possibility of designating the property as a wildflower sanctuary. Other uses were also being considered for the area at that time including restoring the main building for scout work and establishing a bathing beach.

By 1940, the Garden Clubs and the Forest Service came to an understanding and Garden Club members began to make signs and mark trails with help from White Cloud Ranger Station, though activities ceased during World War II.

Discussions resumed after the war, but it took until 1950 to clear all the hurdles necessary to formalize the relationship. An agreement between the Garden Clubs of Michigan and the Forest Service was formally signed on April 28, 1950. Loda Lake Wildflower Sanctuary – the only wildflower sanctuary in the Forest Service system – was born.

It was during this time period that Bass Lake was renamed as Loda Lake. In a letter dated October 32, 1942, Forest Supervisor W. I. White noted that the name "Bass Lake" applied to 65 different lakes in Michigan. He went on to state "… a very detailed study was made …to determine names which might have some local significance, a euphonious sound which would not be difficult to pronounce, and similar considerations. The significance of the name "Loda" is this: Loda or Lonidaw was the wife of Chief Simon Pokagon, the Great Potawatomi Chief. Simon was a guest of Mayer Carter Harrison during the Chicago Worlds Fair of 1893, at which time he delivered an outstanding speech."

Wildflower Sanctuary management goals
Loda Lake is a sanctuary for native wildflowers, grasses, trees and shrubs. The primary management goal for the sanctuary is to restore the plants and natural communities that grew here originally and that might have grown here. This is accomplished through planting nursery stock as well as rescuing and transplanting plants from nearby development sites. Plant rescue operations transplant plants from areas designated for destruction to new, but similar habitat environments. These are only done after careful consideration of invasive plant issues and legal procedural requirements.

Managing with fire
The Huron-Manistee National Forest strives to maintain an excellent fire management program. As a natural process of a forest ecosystem, prescribed burning is used for the improvement of forest habitat and the regeneration of several plant species, as well as reducing the buildup of dead grasses, twigs, and downed branches that can fuel forest fires.

Fire is a natural part of many ecosystems on the Huron-Manistee National Forests. Ecosystems such as jack pine forests, prairies, pine barrens and savannahs evolved with fire. Modern firefighting altered the natural cycle of fire that maintained these valuable habitats. As a result, many plants, birds and insects have become rare or endangered, including the federally endangered Karner Blue Butterfly.

Fuel management is an import part of the forests' fire program. Fire reduces the natural buildup of forest fuels (twigs, branches and dead grasses). Prescribed fire consumes available fuel, reducing the potential for catastrophic wildfire. Fire in the ecosystem is a natural and revitalizing process, because it does the following:

- reduces the accumulation of forest fuels that increase the chance for a devastating wildfire;
- recycles forest nutrients into the soil;
- minimizes insect populations and spread of disease;
- encourages and maintains the growth of native trees and plants best suited to the fire adapted ecosystems;
- removes forest litter, preparing a seed bed so that seeds can take root; and
- removes non-native species that threaten an ecosystem's health

Prescribed burning can effectively and safely restore fire to an ecosystem. Prescribed fires are carefully planned in advance, long before ignition happens. Burns are done only when optimum temperature, humidity, wind speed and fuel moisture content occur - ensuring that the fire remains inside the designated boundaries and accomplishes objectives. Fire lines are either plowed or mowed, depending on the fuel type to be burned. Burns are often done in late afternoon or at night, when weather conditions are ideal to carry out a burn safely.

Partnerships
Loda Lake Wildflower Sanctuary is a result of a strong partnership between the Forest Service and the Garden Clubs of Michigan that dates back to the 1930’s. In addition to

their work in helping to create the Sanctuary, Garden Clubs of Michigan hired a botanist to do plant surveys and layout plant identification trails; developed and funded brochures and trail guides; developed a picnic area with grills; funded construction of a boardwalk and resting benches; and developed and maintained a visitors' log. Garden Clubs of Michigan continues to assist in planning and management of Loda Lake. Garden club members fund and work on restoring Michigan native wildflowers, grasses, shrubs and trees to the sanctuary.

Additional groups provide important support for Loda Lake Sanctuary including the Northwest Michigan Chapter of the North Country Trail, several Boy Scout troops, Northwestern Michigan College at Traverse City, Ferris State College, and the Young Adult Conservation Corps. The Fremont Area Community Foundation's funding has supported: development of this Interpreter's package, updated trail signage, purchase of native plants and materials for restoration, community awareness enhancement, and replacement of two foot bridges. The Eastern National Forest Interpretive Association also provided support for the Interpreter's package.

The Huron-Manistee National Forest

The Huron-Manistee National Forests comprise almost a million acres of public lands extending across the northern lower peninsula of Michigan. They provide recreation opportunities for visitors, habitat for fish and wildlife, and resources for local industry.

The forests of northern Michigan are rich in history. In the late 1800s logging was at its peak and these forests were quickly cut and cleared. In 1909, the Huron National Forest was established and the Manistee National Forest was formed in 1938. In 1945, these two National Forests were administratively combined. Working hand in hand with the Michigan Department of Natural Resources and other partners, the Forest Service has changed the "lands that nobody wanted" to healthy forests again. We've made great progress in recovering these lands but a great deal of work remains, much of which is being done through partnerships.

For Teachers

Each of these three activities is suitable to conduct with your students at Loda Lake. You can also use them in the classroom before or after a visit to the wildflower Sanctuary.

Photo Credits

- Wildflower photographs by Ross Frid Photography (unless noted otherwise)
  - Blueberry
  - Witch hazel
  - Sundew
  - Pitcher plant
  - Trailing arbutus
  - Purple loosestrife
  - Autumn olive
  - Periwinkle
- Historical photos courtesy of the Ditlow family collection and the White Cloud Public Library
- Pileated woodpecker – Dave Herr
- Wild turkey – Dave Herr
- Muskrat – Dave Herr
- Great blue heron – US Fish and Wildlife Service
- American (pine) marten – US Fish and Wildlife Service
- Red-winged blackbird – National Biological Information Infrastructure (NBII) http://images.nbii.gov/
- Ruby-throated hummingbird – NBII
- Karner blue butterfly J & K Hollingsworth
- Tree Cross Section © 1994-2007 by Henri D Grissino-Mayer All rights reserved]
- Poison Sumac – Norman Melvin USDA-NRCS Plants Database
- Spotted knapweed – Elaine Haug USDA-NRCS Plants Database

Citations for maps

Vegetation circa 1800
Comer, P.J., D.A. Albert, H.A. Wells, B.L. Hart, J.B. Raab, D.L. Price, D.M. Kashian, R.A. Corner, D.W. Schuen.
Michigan's Native Landscape, As Interpreted from the GLO Surveys 1816-56, Michigan Natural Features Inventory, 1995
Map by Helen Enander, MNFI

Land Cover Change 1800s-1978
Unchanged Vegetation in Michigan, circa 1800 - 1978, Michigan Natural Features Inventory, Joshua Cohen, Mike Kost, and Helen Enander,

1992 Land Cover
National Land Cover Data, USGS
Map by Helen Enander, MNFI

Quanternary Geology
Quarternary Geology of Southern Michigan , W.R. Farrand and D.L. Bell, 1982, The University of Michigan
Map by Helen Enander, MNFI